

Serial No. 09/697,570

Markings to Show Changes Made," showing the current amendments to the claims is attached hereto.

Please amend the above-identified application as follows:

**IN THE CLAIMS:**

Please replace the previous version of the claims with the following clean version, wherein claims 1 and 7 incorporate new amendments thereto.

C<sup>1</sup>  
1. (Twice Amended) An actuator for moving a driven member, said actuator comprising:

- a displacement element for producing a specific displacement;
- a drive member connected to one end of said displacement element and which transfers the displacement of said displacement element to a driven member;
- a stationary member which supports the other end of the displacement element;
- a compression member for pressing said drive member against the driven member such that the drive member and the driven member are in a state of intermittent contact, and under conditions near a condition of transition from the intermittent contact state to a normal contact state; and
- a drive circuit for driving said displacement element.

2. An actuator as claimed in claim 1, wherein a following relationship is satisfied:

$$N_t = X_0(1/(1/k_2 + 1/k_3) - 1/(1/k_1 + 1/k_2 + 1/k_3))$$

when a spring constant of the compression member is designated  $k_1$ , a combined spring constant of the displacement element and the drive member is designated  $k_2$ , a spring constant of the driven member is designated  $k_3$ , an amount of displacement of the displacement element is designated  $X_0$ , and a compression force applied by the compression member is designated  $N_t$ .

3. An actuator as claimed in claim 2, wherein said drive circuit drives said displacement element at a resonance frequency.

4. An actuator as claimed in claim 1, wherein said drive circuit drives said displacement element at a resonance frequency.

5. An actuator as claimed in claim 1, wherein said displacement element is a laminate type piezoelectric element.

C' cont.  
6. An actuator as claimed in claim 5, wherein said displacement element includes alternating layers of a plurality of piezoelectric thin plates and electrodes.

7. (Twice Amended) An actuator for moving a driven member, said actuator comprising:

a first displacement element for producing a first specific displacement;

a second displacement element for producing a second specific displacement having a direction which has a predetermined angle to a direction of the first specific direction of said first displacement element;

a drive member connected to one end of each of said first and second displacement elements and which transfers the displacement of said first and second displacement elements to a driven member;

a stationary member which supports the other end of each of the first and second displacement elements;

a compression member for pressing said drive member against the driven member such that the drive member and the driven member are in a state of intermittent contact, and under conditions near a condition of transition from the intermittent contact state to a normal contact state; and

a drive circuit for driving said first and second displacement elements.

8. An actuator as claimed in claim 7, wherein a following relationship is satisfied:

$$N_t = X_0 \left( \frac{1}{1/k_2 + 1/k_3} - \frac{1}{1/k_1 + 1/k_2 + 1/k_3} \right)$$

when a spring constant of the compression member is designated  $k_1$ , a combined spring constant of the first and second displacement elements and the drive member is designated  $k_2$ , a spring constant of the driven member is designated  $k_3$ , an amount of displacement of the first and second displacement elements is designated  $X_0$ , and a compression force applied by the compression member is designated  $N_t$ .

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cancel*

9. An actuator as claimed in claim 8, wherein said drive circuit drives said first and second displacement elements at a resonance frequency.

10. An actuator as claimed in claim 7, wherein said drive circuit drives said first and second displacement elements at a resonance frequency.

11. An actuator as claimed in claim 7, wherein each of said first and second displacement elements is a laminate-type piezoelectric element.

12. An actuator as claimed in claim 11, wherein each of said first and second displacement elements includes alternating layers of a plurality of piezoelectric thin plates and electrodes.

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